

Mitsubishi Electric Guide to Part O of the Building Regulations: Mitigation of Overheating in Dwellings



Information Guide

88





Mitsubishi Electric Guide to Part O of the Building Regulations: Mitigation of Overheating in Dwellings



This is an independent guide produced by Mitsubishi Electric to enhance the knowledge of its customers and provide a view of the key issues facing our industry today.

This guide accompanies a series of seminars, all of which are CPD certified.

Contents

Introduction: Why do UK homes need heat mitigation?	Page Four
Why are some UK dwellings at risk of overheating?	Page Six
Part O of the Building Regulations	Page Ten
Demonstrating compliance with Part O	Page Fourteen
Practical approaches to tackle overheating	Page Twenty One
Part O and other Building Regulations	Page Twenty Four
Conclusions	Page Twenty Five
Referencess	Page Twenty Six



Introduction: Why do UK homes need heat mitigation?

Given the regular rainy and chilly conditions of the UK weather, it's difficult to foresee a time when overheating in homes could be a serious problem in this country. However, the impacts of climate change are already being felt.

The UK Met Office has one of the longest weather observation records in the world, beginning in 1884. Its latest State of the UK Climate Report¹, published in July 2024, shows that 2022 and 2023 were the warmest since records began.

Significantly, research shows that extremes of temperature in the UK are changing more than averages. The 1991 to 2020 meteorological average summer temperature is 14.59°C, which seems quite low but is warmer than the 1961-1990 average of 13.78°C

However, in the decade from 2014 to 2023, the number of 'hot' days (28°C and above according to the Met Office) has more than doubled, and 'very hot' days (30°C) more than trebled compared to the twenty-nine years between 1961 and 1990.

Heatwaves are also becoming more frequent and intense, with 2018, 2019, 2021 and 2022 seeing new temperature records set. The summer of 2022 marked a milestone in UK weather history with 40°C recorded for the first time in England and high temperature records set in Wales and Scotland.

The UK Met Office² predicts that in the next decade, we can expect UK summers to be hotter, with the increased likelihood of higher-than-average temperatures and with less rain.

What is a heatwave?

The Met Office definition of a 'heatwave' is threshold-based³, and thresholds vary by UK county because of climate differences across the country. Maximum temperatures must reach a specific threshold for three consecutive days to be an official heatwave. Until the Summer of 2022, the threshold levels were based on a reference climate period from 1981-2011.

However, they were updated in 2022 to the most recent climate averaging period of 1991-2020 to reflect the overall rising average. For example, the heatwave threshold for Surrey, Berkshire, Buckinghamshire, Bedfordshire, Hertfordshire and Cambridgeshire rose from 26°C to 27°C.

These rising temperatures have significant implications for the UK. Extreme heat causes serious health issues for certain sections of the population, including the elderly, infants and those with chronic medical conditions such as asthma, heart problems and diabetes. Heat also impacts sleep patterns, as well as impairing mental function for a wider proportion of the population.

The UK Health Security Agency (HSA)⁴ estimated that during the summer of 2023, an estimated 2,295 deaths were associated with periods of high temperatures. It's important to note that 2023 was only the eighth warmest on record. A UK Parliamentary report titled Public Health Impacts of Heat⁵ notes that across the UK between 2018 and 2022, heat-mortality in people aged over 65 increased by 57% compared to the years 2000 to 2004.

High temperatures also put pressure on the NHS as more people seek emergency medical attention and increase GP visits. In addition, hot weather creates problems for equipment in medical facilities, including cancellation of surgeries or failure of IT systems due to overheating. Given the risks associated with rising temperatures, protecting people in their homes becomes a critical public health issue. Although 'overheating' can be a subjective issue (since people experience temperatures differently) it is useful to have a definition.

BRE⁶ notes that the World Health Organisation (WHO) states that temperatures above 24°C cause 'discomfort' and harm in more susceptible members of the population. Research from 2005 by Arup⁷ for what was then the Department for Trade and Industry (DTi) suggested that people feel warm at 25°C and 'hot' at 28°C.

These figures are a measure of air temperature and it is important to note that other factors such as relative humidity, lack of air movement and length of exposure to high temperatures will also have a critical impact on the occupant experience. High humidity combined with high temperatures makes it difficult for the human body to expel excess heat by evaporating sweat into the air. Still air and humidity therefore make hot weather feel 'hotter'.

Part O of the Building Regulations was introduced in 2022 to tackle the growing challenge of overheating in new dwellings (it does not address existing buildings).





Why are some UK dwellings at risk of overheating?

Many countries experience high temperatures regularly without negative impacts because their buildings are designed to ensure occupant comfort in hot weather. However, it is the unexpected nature of hotter weather and the increasing peaks of heatwaves that causes problems for dwellings and occupants in the UK.

Here, building regulations have focused on delivering air-tight, well-insulated homes that are energy efficient in a cool climate. These features are designed to make dwellings more energy efficient and comfortable in cold weather. However, without appropriate consideration for the impact of hot weather, these same features can trap heat in the building, creating discomfort for occupants, particularly if high temperatures continue overnight, preventing natural cooling.

As the National House Building Council (NHBC)⁸ notes in its guide produced with BRE Trust:

"If as expected, climate change leads to a further increase in summer temperatures, then overheating will become even more of an issue and one that cannot be ignored."



There are other factors that make UK homes more prone to overheating. One is that around 85% of the UK population lives in urban areas. Towns and cities are more likely to experience higher temperatures than surrounding countryside.

This is known as the urban heat island (UHI) effect, whereby materials such as concrete and brick absorb heat which is then trapped by surrounding buildings. Heat from the sun is exacerbated by human activity such as traffic or heat exhausted from building cooling systems. Lack of green spaces or open water create heat build-up during the daytime, and this is then released at night - creating a spiral of rising temperatures. The UHI effect has been shown to increase urban temperatures by 10°C compared with surrounding rural areas.

Urban overheating will become more of an issue as the UK government drives forward with its housebuilding targets. In December 2024, Housing Minister Matthew Pennycook told the House of Commons that the government will be "focusing (housing) growth on city regions".

Along with the trend to urbanisation, we are also seeing changes in the type of housing being developed. The UK's build-to-rent sector is growing rapidly, with apartment blocks springing up across cities including London, Birmingham and Manchester.





Why are some UK dwellings at risk of overheating?

The Parliamentary Report on the Public Health Impacts of Heat points to seven characteristics that increase the risk for indoor overheating, shown in Table 1:

Table 1	
Dwelling type	Flats have a higher risk of overheating compared to detached houses.
Dwelling size	Dwellings with a smaller floor area are at high risk of overheating.
Floor level	Top floor apartments are at higher risk, particularly those with inadequate roof insulation.
Windows	Single-aspect flats are at high risk of overheating due to inadequate ventilation. Dwellings with large windows are a higher risk from solar gain.
Shading	Buildings with limited shading are at higher risk due to heat gain from the sun.
Insulation	This can be a complex issue. UK dwellings with high levels of insulation overheat more frequently, possibly due to decreased airflow. However, adequately installed insulation can effectively prevent overheating, particularly combined with ventilation.
Occupant behaviour	Occupants can reduce overheating by adjusting ventilation and cooling systems. However, access to such measures can vary and is often linked to socioeconomic status. Many cannot afford cooling systems and opening windows for ventilation is not always desirable or possible due to concerns for safety, noise and air quality.

(Table 1: From Public Health Impacts of Heat Table 4)

The NHBC has a similar list of factors for overheating risk, shown in Table 2:

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Table 2	
Site context	Buildings close to noisy and polluting roads, railways or factories may compromise occupants' ability to open windows for ventilation.
Urban Heat Island effect	Hard and dark coloured materials like concrete, brick and macadam have the tendency to absorb the sun's energy and heat generated during the day and re-radiate this at night. As a result of this, the night-time air temperature remains high.
Orientation	Orientation of a dwelling dictates how much sunlight enters the building. With individual houses, it is possible to design each dwelling to optimise orientation and minimise overheating. However in apartment blocks one flat type must be repeated which can cause different overheating risks depending on position in the building.
Building design	UK buildings designed for the cooler climate may not perform well in rising temperatures. Smaller, denser homes are becoming more common, including single-aspect apartments which can be prone to overheating due to lack of ventilation.
Thermal mass	If building design does not integrate thermal mass with adequate ventilation it may contribute to overheating in the dwelling.
Insulation	This can be a complex issue. UK dwellings with high levels of insulation overheat more frequently, possibly due to decreased airflow. However, adequately installed insulation can effectively prevent overheating, particularly combined with ventilation.
Services design	Uninsulated pipework on some domestic services can contribute to heat build-up in the dwelling. This can be a particular problem in buildings with communal heating systems.

(Table 2: From NHBC Foundation with BRE Trust: Understanding Overheating - where to start)



Part O of the Building Regulations

Part O of the Building Regulations⁹ came into force in England from June 2022 and in Wales from November 2022. Northern Ireland is consulting on similar regulations.

In Scotland, Building Standard 3.28 became mandatory for all residential Building Warrant applications submitted in Scotland from February 2023. This section states that:

"Every building must be designed and constructed in such a way that the risk to the health of the occupants from overheating is reduced."

The regulation applies to residential accommodation occupied by an individual or individuals living together as a family or as a single household. It also applies to a shared multi-occupancy residential building.

In England, the regulation was introduced in response to the increasing likelihood of heatwaves in the UK which was making overheating more likely in modern homes designed to be airtight and well-insulated to retain heat in our cool climate.



Buildings covered by Part O requirements

Part O applies to new residential buildings only. This includes houses and apartments and any new building where "people sleep on the premises," although hotels are exempt. However, developments such as halls of residence and student accommodation, senior living residences and care homes must comply with Part O.

In multi-use buildings, a unit that contains both living accommodation and workspace such as an office must be treated as a 'residential building' if the commercial element can convert to residential use. This refers to spaces where there is direct access between the commercial space and residential area; the two spaces are in the same thermal envelope; and the residential accommodation comprises a 'substantial proportion' of the total unit area. This last point is to be assessed on a case-by-case basis by the building control body.

In mixed-use developments, Part O only applies to those parts of the building that are for residential purposes and any corridor that serves those residential units.

The main provisions of Part O

The first requirement of Part O is to protect the 'health and welfare of occupants.' This is an important point to bear in mind, since any ventilation or temperature control approach applied under Part O is for health, not comfort. So designers should aim to meet the maximum temperature requirements (noted below), not to provide comfort cooling.

This first requirement is met by designing and constructing the building to achieve both of the following:

- i) Limiting unwanted solar gains in summer
- ii) Providing adequate means of removing excess heat from the indoor environment







Part O of the Building Regulations

Methods for achieving Part O provisions

Part O sets out several 'acceptable' strategies for limiting solar gains, shown in Table 3

Table 3	
Solar gain limitation method	Acceptable approaches
Fixed shading devices	 Shutters External blinds Overhangs Awnings
Glazing design	 Size Orientation g-value Depth of window reveal
Building design	For example: Placement of balconies
Shading from adjacent permanent features	BuildingsStructuresLandscaping

(Table 3: Acceptable strategies for limiting solar gains, Part O)

The Regulation also sets out four acceptable methods for removing excess heat:

- Opening windows with cross-ventilation used to improve the impact of this approach
- Ventilation louvres in external walls
- A mechanical ventilation system
- A mechanical cooling system

The emphasis is on using passive means "as far as reasonably practicable." The Regulation notes that mechanical cooling may only be used where it is not possible to remove sufficient heat from the indoor environment without it.

So, before adopting mechanical methods, designers must demonstrate to building control that all passive measures to limit solar gains and remove excess heat have been fully assessed.

One other important to point to note when considering these options is that Part O makes occupant health and safety a priority. It states: "In meeting the obligations, account must be taken of any occupant and their reasonable enjoyment of the residence."

So, any overheating mitigation strategy must take into account the following:





Demonstrating compliance with Part O

There are two permitted approaches to demonstrate compliance with Part O: the simplified or dynamic thermal modelling methods.

Simplified method

Part O (Appendix B) provides a compliance checklist which designers can use to demonstrate compliance with the Regulation to building control bodies.

Under the simplified method for demonstrating compliance, a residential building's overheating risk category is determined by its location as shown in Table 4.

Table 4	
Moderate risk location	England, excluding high risk parts of London
High risk location	Urban and some suburban parts of London (detailed in Appendix C of the Regulation)

(Table 4: from Part O)

High risk locations in London are designated by postcode, and these are listed in Appendix C, along with a heat map of the city, as shown in Diagram C1. In addition, Central Manchester postcodes M1, M2, M3, M5, M15, M16 and M50 are also noted in the Regulation as being at risk of 'elevated night time temperatures'. Designers are advised to follow the guidance for high risk

buildings in these areas.



In addition to geographical location, the second factor to consider in the simplified compliance approach is whether the building can achieve cross-ventilation. This means that it should have openings on opposite facades. Openings (e.g. windows) which are not opposite (for example, in a corner apartment) are not considered adequate.

Reducing solar gain: simplified method

If a building meets these requirements for location and cross-ventilation, then limiting solar gain is the next step. This is achieved by limiting the maximum glazing area to a maximum that is determined by the orientation of the façade.

Part O provides details on maximum permitted glazing, depending on whether an area of a building can achieve cross-ventilation or not and whether it is high or moderate risk. Buildings at high risk of overheating should have reduced glazing on south-facing facades. In addition, residential buildings in high risk areas should provide shading for glazed areas between compass points north-east and north-west via the south.

As noted in Table 1, shading can be provided in the form of:

- **External shutters** (with means of ventilation)
- Glazing with a maximum g-value of 0.4 and minimum light transmittance of 0.7
- Overhangs with 50 degrees altitude cut-off on due south-facing facades only





Demonstrating compliance with Part O

Removing excess heat: simplified method

Part O provides the minimum free areas for buildings (or parts of buildings) that can achieve cross ventilation and those which cannot. The 'free area' is defined in the Regulation as: "The geometric open area of a ventilation opening. This area assumes a clear sharp-edged orifice that would have a coefficient of discharge (Cd) of 0.62)". Tables 5 and 6 highlight the different requirements for buildings with or without cross-ventilation.

Minimum free areas for buildings or parts with cross ventilation

Table 5	High risk locations	Moderate risk locations
Total minimum free area - the area for the whole house, residential unit, shared communal room or common space including any bedrooms	The greater of the following: i) 6% of the floor area ii) 70% of the glazing area	The greater of the following: i) 9% of the floor area ii) 55% of the glazing area
Bedroom minimum free area	13% of the floor area of the room	4% of the floor area of the room

(Table 5: From Part O Table 1.3)

Minimum free areas for buildings or parts without cross ventilation

Table 6	High risk locations	Moderate risk locations
Total minimum free area - the area for the whole house, residential unit, shared communal room or common space including any bedrooms	The greater of the following: i) 10% of the floor area ii) 95% of the glazing area	The greater of the following: i) 12% of the floor area ii) 80% of the glazing area
Bedroom minimum free area	13% of the floor area of the room	4% of the floor area of the room

(Table 6: From Part O Table 1.4)

Dynamic thermal modelling method

While the simplified method of compliance provides a straightforward approach for demonstrating that a building meets Part O requirements, it may not always be the best choice.

The Regulation itself highlights that the simplified method is not suitable for buildings with more than one residential unit and which use a communal heating or hot water system. This is because the significant amounts of horizontal heating or hot water distribution pipework will impact internal heat gains.

What's more, some local authorities require the use of the dynamic thermal modelling compliance method to achieve planning permission. It is best to check local requirements to ensure the correct method is used. For example, the Greater London Authority (GLA) requires that all developments undertake a 'detailed analysis' of the risk of overheating as part of planning applications. The GLA makes specific mention of compliance with Part O as well as TM59 for dynamic overheating modelling.

In addition, the categories 'moderate risk' and 'high risk' may not reflect the exact conditions of a particular site. It may be that only parts of a building are 'high risk,' depending on location and orientation. Dynamic thermal modelling will give designers the opportunity to assess a building's exact requirements and apply solutions best suited to meeting these.

Perhaps the most significant reason to use dynamic thermal modelling to assess compliance with Part O is that it provides a more subtle and nuanced approach identifying potential overheating issues.

As Part O highlights, thermal modelling is useful for residential buildings with high levels of insulation and air tightness - often found in modern residential buildings constructed to meet Part L of the Building Regulations.



Demonstrating compliance with Part O

Demonstrating compliance through dynamic thermal modelling

Part O requires that thermal dynamic modelling compliance follows all of the following guidance:

- CIBSE TM59 Design methodology for the assessment of overheating risk in homes¹⁰
- The limits on the use of CIBSE TM59 set out in the Regulation
- The acceptable strategies for reducing overheating risk listed in the Regulation

CIBSE TM59 provides a standardised approach for using dynamic thermal modelling to gain an accurate assessment of a residential building's overheating risk. It takes into account factors not included in the simplified approach, such as intensity of heat gains, occupancy patterns and internal heat gains from equipment.

As CIBSE notes: "Dynamic thermal modelling can be used to simulate the internal temperature conditions and will therefore help establish whether threshold conditions of discomfort will be reached."

It also highlights that this methodology can be used for all residences, but should be particularly considered for:

- Large developments
- Developments in urban areas, especially in southern England
- Dwellings with high levels of insulation and air-tightness
- Single-aspect flats where cross-ventilation will not be achievable

TM59 requires that designers provide the name and version of the dynamic thermal analysis software used. It must also comply with the requirements of CIBSE AM11: *Building performance modelling*.¹¹

TM59 provides a step-by-step assessment, including the treatment of building elements such as pipework in communal heating systems, air speed assumptions and selection of weather file.



Compliance with CIBSE TM59

TM59 identifies two categories of residential building for compliance purposes. First are homes which are predominantly naturally ventilated, including homes that have mechanical ventilation with heat recovery. These should assess overheating using the 'adaptive' method outlined in CIBSE TM52¹². The criteria for overheating are shown in Table 7.

The second type is residences that are predominantly mechanically ventilated because they have no or limited opportunities for opening windows. This may be due to external noise levels or poor outdoor air quality. These should be assessed for overheating based on CIBSE Guide A¹³.

Predominantly naturally ventilated homes: Criteria for overheating

Table 7	
For living rooms, kitchens and bedrooms	The number of hours during which ΔT is greater than or equal to 1 degree during the period May to September inclusive shall not be more than 3% of occupied hours (CIBSE TM52 <i>Criterion 1</i>).
For bedrooms only	The operative temperature in the bedroom from 10pm to 7am shall not exceed 26°C for more than 1% of annual hours. This equates to 32 hours so 33 or more hours per year above 26°C will be recorded as a fail.

(Table 7: From CIBSE TM59, Section 4.2)





Demonstrating compliance with Part O

Limits on CIBSE TM59

CIBSE's TM59 (Section 3.3) says that windows in each room should be controlled separately and modelled as open when the room is occupied and the internal dry bulb temperature exceeds 22°C.

However, Part O puts certain restrictions on this element of the CIBSE requirements which relate to how open windows impact the safety and security of occupants. Part O sets out requirements for how openings (windows and doors) should be modelled depending on time of day, position of room and internal temperature as shown in Table 8.

Table 8	
Time / condition	Openings modelled to do the following
8am to 11pm : occupied room	 i) Start to open when the internal temperature exceeds 22°C ii) Be fully open when the internal temperature exceeds 26°C iii) Start to close when the internal temperature falls below 26°C iv) Be fully closed when the internal temperature falls below 22°C
11pm to 8am:	Openings should be modelled as FULLY OPEN if both the following apply: i) The opening is on the first floor or above and not easily accessible ii) The internal temperature exceeds 23°C at 11pm
Ground floor or easily accessible room which is unoccupied	 i) In the day, windows, patio doors and balcony doors should be modelled as closed ii) At night windows, patio doors, and balcony doors should be modelled as closed

(Table 8: From Part O Sections 2.5 and 2.6)

Practical approaches to tackle overheating

While Part O requires designers to prioritise passive measures to limit solar gain and remove excess heat, it recognises that this is not possible for all buildings.

Around the UK we are seeing the growth of high-rise apartment buildings in cities like London and Manchester. These are buildings at risk of overheating, and which also create design challenges when dealing with removal of excess heat.

If we consider openable windows as an option for removing excess heat, for example, urban residences are less likely to be able to take this approach. Noise is one issue that will impact comfort for occupants in these buildings.

Section 3.3 of Part O notes that windows are likely to be closed during sleep hours if noise within bedrooms exceeds the limits:

- 40dB LAeqT (continuous sound) averaged over 8 hours between 11pm and 7am
- 55dB L_{AFmax} (maximum sound level) more than 10 times a night between 11pm and 7am

Interestingly, the continuous noise maximum in Part O exceeds that of the British Standard (BS)8233¹⁴ which provides guidance on noise reduction in buildings. For bedrooms between 11pm and 7am, the Standard sets an eight hour average maximum of 30 dB_{LAeq}8h. Sound levels above this maximum are considered disturbing to occupant sleep, with potential health impacts.

Urban building design must also balance overheating mitigation with the impacts of air pollution which can be exacerbated by open windows. Part O states that buildings close to local pollution sources must be designed to limit the intake of external air pollutants. It cites Part F (Section 2) which highlights the exposure limits of pollutants that must into account.



Practical approaches to tackle overheating

Another issue is with the practicalities of achieving cross-ventilation. While this may be possible in a detached home, it is very difficult in a single-aspect apartment. These factors, along with security issues on lower floors and safety issues at higher levels, mean that openable windows may not be a practical approach for removing excess heat from a residence.

A single issue does not prevent the use of passive measures to reduce solar gain and remove excess heat. However, cumulatively noise and air pollution, safety risks, design issues such as orientation and location stack up to put openable windows out of the question for many modern residential projects.

Many designers are turning to mechanical ventilation as a robust, measurable and practical option to meet the requirements of Part O, and to deliver other benefits to building developers and occupants.

Mechanical ventilation

Mechanical ventilation meets the requirements for excess heat removal by delivering continuous ventilation in occupied spaces in a controlled and predictable manner.

It offers a practical solution for designers where cross-ventilation cannot be achieved and overcomes the problems of openable windows in urban areas, particularly the safety and security issues associated with open windows. Mechanical ventilation can also operate at night to remove heat from bedrooms with no disturbance to occupants.

Mechanical ventilation with heat recovery (MVHR) also provides additional benefits beyond simply removing excess heat. For example, Mitsubishi Electric's residential Lossnay MVHR helps to stop pollutants in outdoor the air entering living spaces, this includes the option to include a NOx filter.

Another useful Lossnay feature is the cooling unit, which can be used where needed, for example in south-facing apartments where orientation adds to the overheating problem. This helps to keep indoor temperatures to the required maximum.

The Lossnay cooling unit is self-contained, with no outdoor unit. It also has an interface controller including temperature sensing to automate operation.





The benefit of this approach to indoor temperature control is that it can be used for pre-emptive cooling, to reduce the peak indoor temperature and a capacity. Diagram 2 shows how reactive cooling begins once the indoor temperature reaches the maximum 26°C. This requires optimum cooling capacity to reduce the temperature.

However, if we apply pre-emptive cooling (known as 'peak lopping') over a longer duration, before the maximum temperature is reached, indoor temperatures may still rise but the peak temperature at the hottest part of the day can be maintained below Part O requirements. Keeping the dwelling cooler for longer also ensures the building's thermal mass is not heat soaked before activating any type of reactive cooling.





Graph represents the effect of internal temperature when providing cooling before apartment temperature has risen above 26°C.



Part O and other Building Regulations

Part O interacts with all other Building Regulations, but in the context of ventilation provision, Part L (Conservation of Fuel and Power) and Part F (Ventilation) are important.

Part O provides guidance on using openings such as windows to remove excess heat from indoor spaces. Where these are used, Part O notes that the amount of ventilation for excess heat is likely to be higher than the purge ventilation required under Part F. Here, the higher amount of ventilation applies.

And in the case of Part L, it is noted in Part O that solar gains in winter can help to reduce the amount of space heating required. This lowers energy use in heating systems. Lowering solar gain by reducing glazing areas, as recommended in Part O, will reduce this benefit and may increase the need for winter heating. In both cases, the use of mechanical ventilation with heat recovery can help to alleviate these issues. MVHR can meet the requirements of Part F in a predictable and controllable manner - which is not always possible with natural ventilation.

And MVHR is highly successful at delivering ventilation into spaces during cooler months, since heat from extracted indoor air is applied to incoming air - reducing the need to boost heating. Thus, MVHR can support healthy indoor environments year-round.



Conclusions

UK temperatures are set to rise in the next decade, with heatwaves increasingly likely. Overheating has a significant impact on occupant health. At the least it impacts sleep patterns, but at worse it can lead to health emergencies and long-term conditions particularly in the elderly and very young.

While some elements of building design such as orientation and shading can address the problem, it is not always practical to use these approaches. City centre apartments, which are springing up across the UK, are particularly prone to challenges such as highly glazed, south-facing facades.

MVHR is an excellent option for these new residences. It delivers a practical and robust solution for mitigating overheating, while providing additional benefits such as good indoor air quality all year round.

Modern solutions such as Lossnay with its cooling unit go further by providing designers with a focused solution for those difficult to tackle overheating areas identified during dynamic thermal modelling.





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email: livingenvironmentalsystems@meuk.mee.com web: les.mitsubishielectric.co.uk



UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England General Enquiries Telephone: 01707 282880

IRELAND Mitsubishi Electric Europe Plunkett House, Grange Castle Business Park, Nangor Road, Dublin 22, Ireland. Telephone: (00353) 1 4198800 Email: sales.info@meir.mee.com Web: les.mitsubishielectric.ie

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The use range of the guidance of the art please refer to the relevant dealers are conditional reference of the art based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:631), R454B (GWP:466), R515B (GWP:292), R454C (GWP:148), R1234ze (GWP:7) or R1234yf (GWP:4). "These GWP values are based on IPCC 6th edition."

Effective as of May 2025



